E-Ray
FlexRay™ Protocol Controller

AURIX™ TC3xx Microcontroller Training
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E-Ray
FlexRay™ Protocol Controller

**Highlights**

- E-Ray module performs communication according to the FlexRay™ protocol specification v2.1
- E-Ray module supports data rates of up to 10 Mbit/s on each channel.

**Key Features**

- Configuration of up to 128 message buffers
- Filtering based on slot, cycle, and channel value

**Customer Benefits**

- Allows greater flexibility with definition of a network
- Simplifies definition of acceptance or transmit criteria for each message
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Configuration of up to 128 message buffers

- 8 Kbyte of Message RAM for storage of e.g. 128 Message Buffers with max. 48 byte data field or up to 30 Message Buffers with 254 byte Data Sections
- Configuration of Message Buffers with different payload lengths possible
- Each Message Buffer can be configured as receive buffer, as transmit buffer or as part of the receive FIFO
- Host access to Message Buffers via Input and Output Buffer
  - Input Buffer: Holds message to be transferred to the Message RAM
  - Output Buffer: Holds message read from the Message RAM
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Filtering based on slot, cycle, and channel value

› Acceptance filtering ➔ checking specific fields in a received Frame against the corresponding configuration values of the valid Message Buffers

› Transmit filtering ➔ comparing the configuration constants of the valid Message Buffers against the actual slot and cycle counter values

› Filtering is done on the following fields:
  – Channel ID
  – Frame ID
  – Cycle counter

› The following filter combinations for acceptance / transmit filtering are allowed:
  – Frame ID + Channel ID
  – Frame ID + Channel ID + Cycle Counter
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System integration

E-RAY module is connected to several external modules:

› Clock Control: generates all the necessary clocks for the E-RAY module

› Interrupt Router: schedules service requests coming from various E-Ray interrupt sources

› Port Control: connects the E-RAY module pins to the external GPIO pins

› External Clock Output Unit (SCU module): distribution of Macro Tick as time base for distributed system control

› External Request Unit (SCU module): possibility of triggering stop watch events and providing global time e.g. to the on-chip timers
Application Example
Active suspension control

Overview

- Used in the adaptive suspension control systems that act simultaneously as an active anti-roll stabilizer and an electronic shock absorber
- “X-by-Wire” system; mechanical or hydraulic control systems are replaced by fully electrical or electronic solutions

Advantages

- CAN lacks deterministic and fault-tolerant aspects that are mandatory for “X-by-Wire” systems
- Due to its higher bandwidth (10 Mbps) in comparison with CAN overall system complexity will be reduced, which offers a path for more cost-effective solutions
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